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SPRAYING AND ATOMIZING DEVICE

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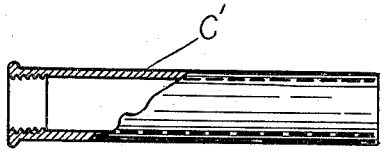


FIG. 3

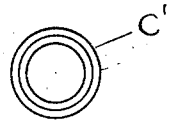


FIG. 4

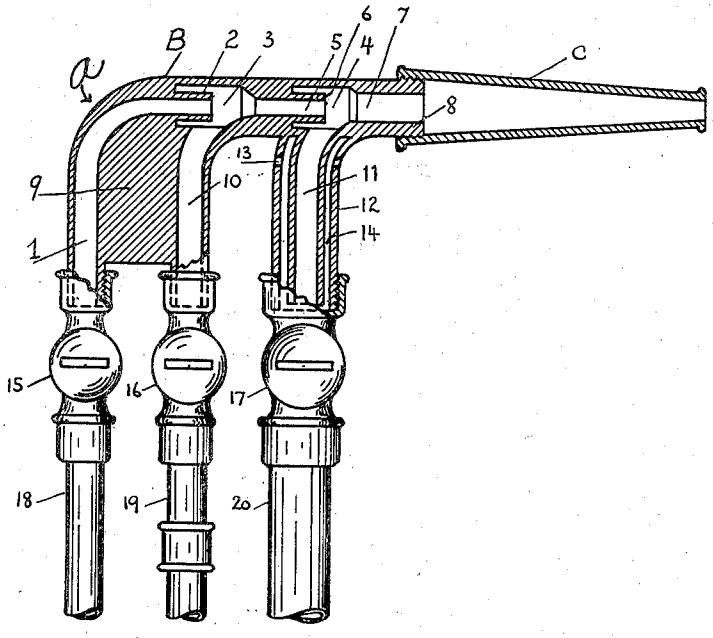


FIG. 1

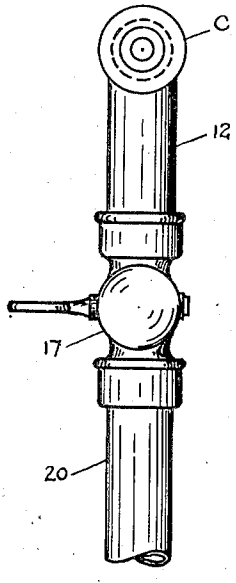


FIG. 2

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SPRAYING AND ATOMIZING DEVICE

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5 Claims. (Cl. 299—140)

Generically this invention relates to a spray device, but it more especially is directed to the type adapted to effect atomization of a cleaning fluid or substance.

One of the principal objects of this invention is the provision of a unique nozzle comprising a spray head formed from a one-piece casting having a trio of parallel intake passageways, terminating in aligned discharge nozzles extending at right angles to said inlet passageways, two of said intake passageways having connection, respectively, with a source of air and water under pressure and the third with a cleaning fluid or substance, and means for aerating or effecting atomization of said substance prior to its discharge from said head, and a nozzle element detachably engageable with the common discharge nozzle of the spray head in accordance with the particular operating requirements.

Another important object of this invention is the provision of a spraying device of this character comprising a nozzle in the nature of a head having aligned vacuum chambers and discharge nozzles projecting within said chambers and in communication with, respectively, a source of air and a source of water under pressure, and a double walled mixing and vacuum chamber formed with air inlets and in communication with a source of cleaning fluid or other substance, said chamber communicating with one of said aligned vacuum chambers whereby a thorough aeration of said fluid or substance is effected prior to its being entrained by said air and water stream and discharged from said nozzle.

A further important object of this invention is the provision of a spray nozzle of this character including a head or body portion formed from a one-piece element having a trio of spaced parallelly extending vertical passages terminating in aligned discharge nozzles at right angles to said intake passages and a detachable discharge nozzle connected to the free end of said head portion, the passage adjacent to said discharge nozzle and communicating with a source of cleansing fluid or other substance having a surrounding jacket adapted to form with said passage a mixing and aerating chamber, the intermediate passage being connected to a source of water supply under pressure and the third passage being connected to a source of air supply under pressure, and control valves mounted adjacent to the base of said head, whereby said fluid, and either air or water or the aerated mixture may be expeditiously controlled as desired.

With these and other objects in view, which will become apparent as the description proceeds, the invention resides in the construction, combination and arrangement of parts, hereinafter more fully described and claimed, and illustrated in the accompanying drawing, in which like characters of reference indicate like parts throughout the several figures, of which:

Fig. 1 is a side elevation of our improved nozzle device partly in section.

Fig. 2 is a front view of Fig. 1.

Fig. 3 is a detailed view partly in section, of a different type of detachable nozzle.

Fig. 4 is an end view of Fig. 3.

The spray nozzles heretofore in use with which we are familiar have proven deficient in many respects, such as involving intricate construction, costly to manufacture, unwieldy to handle, having a number of operating parts including a plurality of air control mechanisms, and wherein it is difficult to effect complete aeration or atomization of the cleansing or other fluid to be broken up, before being mixed with either the water or air under pressure used for entraining said fluid, and it was to overcome such deficiencies and to provide a light, simple, compact nozzle device adapted to eliminate all operating and settable valve structures, excepting a single control valve for the compressed air, water, and cleansing fluid or other solution, wherein the discharge nozzles within the device are in aligned communication, and complete aerating or atomizing of the solution is effected before entering the combined water and air stream for ultimate discharge from the device, and wherein either the air pressure or water pressure may act to entrain said solution in the same manner whether combined or separately, according to the exigencies of the particular operating requirements, that we designed the device forming the subject matter of this invention.

In the illustrated embodiment characterizing this invention there is shown a nozzle device or spray gun A comprising a body or head portion B and a detachable nozzle member C.

The device is preferably constructed from aluminum, with the body or head portion B cast in one piece. The portion B is formed adjacent to its rear edge with a passage 1, for air under pressure above atmospheric pressure, extending upwardly and curved inwardly at its upper end and to the free end of nozzle 2, extending horizontally within the substantially cone-shaped chamber 3 formed adjacent to the upper edge of said portion B, and connected with a similar cone-shaped aligned chamber 4, by passage 5

extending through a nozzle 6 similar to and in horizontal alignment with nozzle 2, and extending within chamber 4, the latter being similar to chamber 2, except the discharge passage 7 is of greater diameter than the passages 1 and 5. The passage 7 extends through the discharge nozzle 8 projecting exteriorly from said head in longitudinal alignment with the nozzles 2 and 6. Said nozzle 8 is adapted for threaded engagement with the detachable nozzle element C or interchangeable nozzle C' depending upon the particular operating requirements as will hereinafter more fully appear.

Spaced from passage 1 by the block or solid portion 9 is a similar parallel passage 10 communicating at its upper end with chamber 3 for water under pressure which is acted on by the air passing through nozzle 2 and issues from nozzle 6 in an aerated jet, as will directly more fully appear.

Parallelly spaced from passage 10 and communicating with chamber 4 is a tubular passage 11 similar to passages 1 and 10, and surrounding said passage spaced from the wall and intake end thereof is a jacket 12 formed adjacent to its upper end with a plurality of air inlet openings 13 for the admission of air to the double walled aerating chamber 14, effecting a thorough aeration of the fluid passing through said chamber and before being entrained by the combined flow of air and water from passages 1 and 10 through chamber 4 for discharge from nozzle C, as will more fully appear as the description proceeds.

In order to more expeditiously control the flow of air and water, and the fluid or substance to be treated, to the device, the latter is provided with control valve mechanisms 15, 16, and 17 threadedly engagable with the tubular ends of passages 1 and 10 and chamber 14, respectively, and which are suitably connected to sources of air and water under pressure and cleansing fluid, such as soap or the like, by the hose or pipe conduits 18, 19, and 20, respectively.

While the operation of the device would seem to be clear from the above description, it might be well to further state that the air and water under pressure is mixed in chamber 3 and passes from nozzle 6 into chamber 4 in the form of an aerated jet, forming a vacuum in chamber 14 and drawing the cleansing fluid or other fluid to chamber 4, at the same time drawing air through inlet openings 13 and equally distributing it into the body of cleansing fluid at the intake end of said mixing chamber, so that said fluid is thoroughly aerated before it reaches chamber 4 and entrained by said aerated stream for discharge from said nozzle.

It will be further apparent that the central passage 11 and the annular jacket 12 are in communication with the cleansing fluid and the air passing across and through the two bodies of fluid, effects a greater aeration than if there were only one body of if it was admitted directly to the central passage.

It will also be observed that the particular aligned and communicating arrangement of the nozzles 2, 6, 8, and C and chambers 3 and 4 and the relative arrangement of the passages with respect thereto, eliminates obstructions and retarding of the air or water flow, where certain of the inlet passages are at angles to the main direction of flow, and effects a maximum velocity of fluid flow from the respective nozzles, by reason of the direct line flow from each to the final nozzle C. This arrangement also permits a grouping of the control valves, and where another substance is substituted for the water, utilizing the compressed air to entrain said substance in addition to the cleaning or other fluid, for discharge from nozzle C, as will be apparent without further discussion.

From the above it will be apparent that we have designed a simple, light weight, compact spraying and atomizing device, comprising few parts, manufacturable at a minimum of cost, and efficient for the purposes intended, and while we have preferably described it as a washing or cleaning device, especially adapted for washing automobiles and the like, it is to be understood that its adaptive use is not so limited since it lends itself with equal effectiveness to many other uses, such as spraying trees, shrubbery, plants, and the like.

Although in practice we have found that the form of our invention illustrated in the accompanying drawing and referred to in the above description as the preferred embodiment, is the most efficient and practical, yet realizing that conditions concurrent with the adoption of our invention will necessarily vary, we desire to emphasize that various minor changes in details of construction, proportion and arrangement of parts, may be resorted to within the scope of the appended claims without departing from or sacrificing any of the principles of this invention.

Having thus described our invention, what we desire protected by Letters Patent is as set forth in the following claims:

1. An atomizing spray device comprising a head having a pair of aligned intake and discharge communicating vacuum chambers having inlet and outlet ends, respective aligned nozzles extending from the inlet ends within said chambers, communication between the chambers being through the nozzle extending within the discharge chamber, an intake passage for air under pressure communicating with the inlet end of the nozzle of the intake chamber of the pair, an additional intake passage for fluid under pressure communicating with said intake chamber, a discharge nozzle extending from the oulet end of the discharge chamber of the pair toward which fluid is directed from said aligned nozzles, a double wall aerating chamber communicating with said discharge chamber and extending downwardly therefrom, said aerating chamber comprising a centrally disposed mixing chamber, an air chamber surrounding said mixing chamber closed at its upper end and with its open lower end extending beyond the end of the central chamber and having air inlet means at its upper end, cleansing fluid conduit means connected to the lower end of said air chamber, whereby aeration of said cleansing fluid is effected prior to its being entrained by said air stream and discharged from said nozzle.

2. An atomizing spray device comprising a head having a pair of aligned intake and discharge communicating vacuum chambers having inlet and outlet ends, respective aligned nozzles extending from the inlet ends within said chambers, communication between the chambers being through the nozzle extending within the discharge chamber, an intake passage for air under pressure connected with the inlet end of the nozzle of the intake chamber of the pair, an intake passage for water under pressure communicating with said intake chamber, a discharge nozzle extending from the end of the discharge chamber of the pair toward which fluid is directed from said aligned nozzles, a double wall

aerating chamber communicating with said discharge chamber and extending downwardly therefrom, said aerating chamber comprising a centrally disposed mixing chamber open at its ends, an air chamber surrounding said mixing chamber closed at its upper end and with its lower end extending beyond the end of the central chamber, air inlet means at its upper end, and a cleansing fluid conduit means connected to the lower end of said air chamber, whereby air is admitted to said cleansing fluid stream from all sides to effect aeration thereof in said aerating chamber prior to its being entrained by said mixed water and air stream and discharged from said nozzle.

3. An atomizing spray device comprising a head having a pair of aligned communicating intake and discharge chambers having aligned inlet and outlet openings, respectively, at their ends and through which fluid is directed, respective aligned nozzles extending from the inlet ends within said chambers, communication between the chambers being through the nozzle extending within the discharge chamber, a discharge nozzle extending from the outlet end of the discharge chamber of the pair toward which fluid is directed from said aligned nozzles, a parallel trio of spaced passageways communicating with said chambers and extending at right angles to the axes of said nozzles, for the passage, respectively, of air and water under pressure to the intake mixing chamber of the pair and a cleansing fluid to the discharge chamber of the pair, said air and water constituting a motive fluid for said cleansing fluid, said cleansing fluid passageway constituting an aerating chamber extending downwardly from said discharge chamber and being surrounded by an air chamber having air inlet means at its upper end and in communication at its lower end with said fluid aerating chamber, conduit means connected to the free ends of said passageways and air chamber, whereby aeration of said cleansing fluid is effected in said aerating chamber prior to its being entrained by said aerated water motive fluid in the discharge chamber of said pair and discharged from said nozzle.

4. An atomizing spray device comprising a head having a pair of aligned communicating intake and discharge chambers having aligned inlet and outlet ends through which fluid is directed, respectively aligned nozzles extending from the inlet ends within said chambers, a discharge nozzle extending from the outlet end of the discharge chamber of the pair, and to which is directed by said aligned nozzles the fluid passing through said chambers, communication between the chambers being through the nozzle extending within the discharge chamber, an intake passage for air under pressure constituting a motive fluid communicating with the nozzle of the intake chamber, an intake passage for water under pressure communicating with said intake chamber wherein said water and air are mixed for discharge into the discharge chamber, an intake passage for fluid communicating with the discharge chamber, said last named passage constituting a centrally disposed aerating chamber and having a spaced jacket surrounding said chamber forming an air chamber, said jacket having air inlet means and communicating with the aerating chamber at its free end throughout its perimeter, fluid conduits for the respective passageways and fluid control valves mounted in said conduits and connected to the ends of the respective air and water passages and jacket, whereby the passage of the aerated motive fluid through the discharge chamber causes air to be drawn into the fluid stream from all sides at the lower end of the aerating chamber and said fluid aerated in said chamber prior to its being entrained by the motive fluid in the discharge chamber for passage from said discharge nozzle.

5. An atomizing spray device including a discharge chamber, a passageway for a motive fluid under pressure communicating with said chamber, a discharge nozzle communicating with said chamber, a lateral passageway communicating with the discharge chamber, and an air inlet jacket having air inlet means at its upper end, said jacket surrounding and having its lower end in connection with the lateral passageway for causing a descending column of air to meet and intermingle with an ascending column of fluid for aeration thereof prior to its entrainment with said motive fluid in said discharge chamber for discharge from said nozzle.

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